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Sugar Beets in Eastern South Dakota

Cooperative Extension, South Dakota State University

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Sugar Beets in Eastern South Dakota

The possibility of sugar beet production has developed much interest in South Dakota. This was brought about by an enlarged acreage quota for sugar beets. The number of acres that can be produced in the eastern part of the state will also depend on the capacity of processing plants.

Future sugar beet expansion will depend on the Sugar Act. The revision of the Sugar Act is now being studied in Congress.

REQUIREMENTS

Before a farmer grows sugar beets, he should be sure he can meet the following requirements:

He should have enough irrigable land on which recommended crop rotations can be carried out. This usually requires 100-160 acres of land under irrigation to make an economic unit.

He needs an adequate water supply. It might be possible to produce sugar beets in southeastern South Dakota without irrigation, but sugar beets require more moisture than is normally available, even in this area, for profitable yields.

He must be able to get economically practical freight rates to the processing plant.

He needs available working capital or a line of credit, making possible the purchase of adequate machinery. Sugar beets are a high investment crop to produce, requiring expensive and highly specialized machinery, high rates of fertilizer, hand labor, and extensive cultivation.

And he must have an interest and a desire to become established in sugar beet production and be willing to put forth the additional study and work required to do a really good job.

There should be a concentration of 300 to 1,000 acres of sugar beets within a 14-mile radius of the receiving station.

The sugar industry is a joint enterprise between the grower and producer. The price the grower receives for his crop depends on the sugar content of the beet crop and the net selling price of the refined sugar.

A contract is signed between the processor and the grower that states requirements and responsibilities of each party. These include the procedure of production, harvesting, and payment.

By **W. F. Bergeson,** district manager, U&I Sugar Co.; **John Noonan,** Extension potato specialist, and other Cooperative Extension Service specialists

Long trainloads of sugar beets are commonplace at the U&I factory at Belle Fourche during the harvest season. The beets are rushed to the plant from outlying receiving stations.

PRODUCING HIGH YIELDS

Crop Rotation. A good crop rotation is necessary for high sugar beet production and maintenance of soil structure. The following rotation is recommended.

Plant sugar beets 1 or 2 years.

Plant small grain as a nurse crop for alfalfa or grass legume mixture.

Leave the alfalfa 2 years, plowing the last cutting under the second year (it is a good practice to spray with 2,4-D before plowing).

Use small grain the last year of the rotation. Potatoes, soybeans, or corn may be used if wind erosion is not a hazard.

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SOUTH DAKOTA STATE COLLEGE

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Fertility. Fertility of the soil must be kept at a high level for maximum yields.

The use of 80 to 120 pounds of nitrogen and 60 to 80 pounds of phosphorus (P_2O_5) should be a minimum application for most soils. On land that has had large returns of crop residues or strawy manure in recent years, the nitrogen application should be even higher, especially if the fertilizer is broadcast. It is especially important to have a plentiful nitrogen supply early in the season in order to grow a large thrifty plant. Sandy soils may respond better to a split application of nitrogen, but the second application should be made by late June. Barnyard manure is desirable, especially on newly leveled lands or soils low in organic matter.

Do not apply nitrogen fertilizer after July 1, because nitrogen encourages top growth and depresses sugar content.

Seedbed. Sugar beets require a firm seedbed with moisture near the surface.

Apply commercial fertilizer and manure before plowing. Plow deeply, to 12 inches where possible, to loosen soil for the beets and to cover all trash. Disc and harrow several times to obtain seedbed firmness and to conserve moisture.

Float seedbed at least twice in opposite directions. Harrow after floating and before planting.

Planting. Great care should be taken in planting to obtain a good uniform stand, for it determines yield.

Use a sugar beet planter in good working condition. (Some processors will rent planters at about $1 per acre.)

Plant in rows 22 inches apart. Plant seed 1½ to 2 inches deep, at a rate of 5 pounds per acre. Plant at a speed of no more than 2½ miles per hour.

One seed per 1 inch in the row is desirable.

Plant as soon as the soil can be prepared for a good seedbed. The beet plant is hardy, but may be killed by a heavy freeze. A long growing period is necessary for maximum tonnage. The longer the growing period, the greater tonnage that is possible.

Cultivation. Weed control, thinning and the conserving of moisture can be done by a good job of cultivation. It is more important in beets than corn.

Use of flex-tine harrow is recommended at least once before the beets are up and as many times after as is necessary for weed control and stand reduction. Depth gauge wheels or runners are necessary to control depth and uniformity of cultivation.

A down-the-row cultivator of any good make is recommended when the beets are in the four-leaf stage. Continue the cultivation for weed control until the beets are laid by.

Mechanical thinning with a down-the-row machine is necessary to thin the plants to a population of 100 plants per 100 feet.

Hand labor is necessary to reduce the stand and do final weeding.

Several chemicals have given good weed control in sugar beets in the Red River Valley. Some South Dakota growers may wish to try some of them experimentally. The rates listed are the amounts of chemical required for the area treated. Cost can be reduced by treating 6- to 12-inch bands over the row.

TCA is the best chemical for control of annual grassy weeds (except wild oats). It also gives some control of annual broad-leaved weeds. Apply as a spray at the rate of 6 pounds (7½ pounds of 90% sodium salt) per acre on the area treated at planting time.[1] A good rain or sprinkler irrigation is required to activate the chemical. However, abnormally heavy rains and cool soil may cause poor weed control.

"Tillam" is the trade name for a new chemical that does not yet have a common name, but was tested under the code name R2061. It controls many species of annual weeds. Apply 4 pounds (⅔ gallon) per acre on the area treated before planting. Work the chemical into the soil with a disk or similar implement.

Dalapon (trade name—Dowpon) controls annual grassy weeds after emergence. Apply 2 pounds (2½ pounds of 85% sodium salt) per acre on the area treated before grasses are over 2 inches tall. For taller grasses 4 pounds per acre are required and control is generally poorer. The higher rate sometimes kills wild oats in the 2-leaf stage of growth.

Barban (trade name—Carbyne) controls wild oats. Apply three-fourths pound (3 qts.) per acre in 5 gallons of water when the wild oats is in the 2-leaf stage of growth.

"Avadex" is another chemical that does not have a common name. It controls wild oats. Apply at the rate of 1½ pounds (1½ qts.) per acre on the area treated. Spray on smooth soil surface just before planting. Incorporate the herbicide into the soil with a harrow.

INSECT CONTROL

Insect pests may cause damage to sugar beets. There are several good insecticides which will control these pests, but applicators must follow the direc-

[1]In band applications of herbicides, the actual area treated will be treated at the same rate as in a broadcast treatment, but the overall acreage will have less total chemical applied. In this way band applications hold weed control costs to a minimum. See Extension Fact Sheet (F.S. 124) "Pre-emergence Weed Control in Eastern South Dakota."

tions on the labels closely to stay within the residue and tolerance restrictions.

Beet Webworms can be controlled with Dylox, Endrin, or Toxaphene with good results. Dylox, 50% WP can be used at the rate of 1 to 1½ lbs. per acre. There must be a 14 day waiting period between the last application and harvest or feeding. Tops harvested less than 28 days after treatment should not be fed to livestock. Endrin may be used as a spray or dust at the rate of 0.4 lb. of actual per acre or Toxaphene spray or dust at 3 to 6 lbs. actual per acre. Endrin and Toxaphene each have a 60 day waiting period between treating and harvest for livestock feed. For Endrin, there is a 20 day waiting period if tops are to be plowed under at harvest. Do not feed Toxaphene treated tops to dairy animals or animals being finished for slaughter.

Blister beetles, Flea beetles, and Leaf beetles can be controlled with Toxaphene. The same dosages and restrictions apply as for Toxaphene under the beet webworm recommendations.

Cutworms, Army worms, and **Grasshoppers** can be controlled with either Endrin or Toxaphene. The same dosages and precautions should be used as for the control of beet webworms.

Wireworms, Root maggots may be controlled by using Aldrin as a pre-planting soil treatment. Follow the directions on the label. Aldrin may also be used as a seed treatment at ½ lb. SD, WP chemical per 100 lbs. of seed. Treated seed should not be used for feed or food purposes.

Leaf miners can be controlled with Dylox. Follow the same dosages and restrictions as given under beet webworm recommendations.

DISEASE CONTROL

Sugar beets are hardy plants but there are a few diseases that may reduce yield. Diseases are more serious when sugar beets are grown more than 2 consecutive years on the same field.

Nematodes. The sugar beet nematode, on the basis of recent surveys, have been found only in western South Dakota near Belle Fourche. This area has been growing beets for many years. The disease organism stunts or kills sugar beet plants by attacking the root system. When fields become infested with nematodes, many of the young beets wilt and die just after thinning. However, there are other diseases and certain soil conditions which produce similar symptoms on the plant. Growers suspecting the disease should take a quart size soil sample and send it to the Plant Pathology Department at South Dakota State College for analysis.

No commercial beet variety is resistant to the sugar beet nematode. A strict crop rotation system is the best control when the disease is found. The disease is spread to new areas by machinery and equipment brought in from infested areas. Once the nematode is in the field, it spreads rapidly. Take great care to thoroughly disinfect machinery and equipment brought in from other sugar beet areas. Machinery can be disinfected by the use of formaldehyde and water as directed on the container. After the formaldehyde has been applied by either spray or sprinkler, a tarp or plastic cover should be put over the machine to trap the fumes for about a day.

Seed Rot. Unless sugar beet seed is treated with a chemical seed treatment (fungicide) to prevent soil-borne disease organisms from rotting the seed, poor stands may result. This is especially true if the soil is wet and soil temperatures stay low following planting.

Seedling Disease. Frequently, soil-borne disease organisms infect the tiny sugar beet seedlings as they emerge from the soil. Within 24 hours the seedlings may die, dry up, and be blown away by the wind. There are several different stand reducing diseases which infect roots and tiny stems at the ground line. The seedlings are stunted and yellow, and the stem near the ground line turns dark, and plants usually die. Seed treatment helps control these diseases to some extent, but previous crop rotations are more effective for control. Growers should consider previous cropping when deciding on which field to use for beets. In general, from a disease control standpoint, less seedling disease damage or loss in stand can be expected if sugar beets follow small grain, soybeans, or corn. Legume crops, namely alfalfa, sweet clover, or red clover should not be followed by beets for at least 6 months or a year. While it is satisfactory to follow corn with beets, it causes problems in planting, leveling, and cultivation.

Crown Rot. This is a disease which develops in midseason. Crown rot usually destroys the entire plant by rotting. The plant is usually killed by mid-August. About the only thing which will afford control of this disease is the use of crown rot resistant varieties. Research, however, is making progress in the development of more resistant strains, and more seed of this type is now available.

Leaf Spot. This fungus disease also attacks plants in mid-season. Symptoms are light brown spots with ashen gray centers about 1/16 inch in diameter. When the disease becomes severe, these spots are so numerous they touch and leaves die. This results in reduced yields and sugar content. The use of leaf spot resistant strains is the most effective control. It remains to be seen how effectively these leaf spot resistant strains of

beets will perform in eastern South Dakota. It may be that supplemental spraying with a fungicide may be necessary.

Crop rotation is essential for control of all sugar beet diseases, but is especially important in controlling leaf spot.

WATER, SOIL, EQUIPMENT

Irrigation. The maximum water use of sugar beets is 2½ inches every 10 days and comes in July and August. Therefore, irrigation systems should be designed so they can deliver 3½ inches of water every 10 days to the entire sugar beet acreage. Irrigation systems, however, operate at about 70% efficiency, so to get 2½ inches of water the system must be capable of delivering 3½ inches of total water.

Timely irrigation is extremely important. Check the soil moisture in the top 2 feet of soil at 2 or 3 day intervals during the growing season. When available soil moisture gets down to 50% it is time to start irrigating.

Sugar beet growers should use a commercial moisture measuring device or should become adept at determining available moisture by the "feel test." Contact your county agent for information on moisture instruments or on how to make the "feel test" for your particular soil type.

Soil Types. Sugar beets do well in most soils. However medium texture soil types, which allow beets to expand, are more suitable. Cultural practices should be planned to fit different soil types. Where spring plowing is not practical, plow in the fall, leaving soil rough to prevent wind erosion. Apply fertilizer before plowing.

Machinery. Sugar beet production will require some specialized machinery. Growers may find it desirable to own machinery jointly.

The following are some of the machines required and the approximate cost: beet planter (6-row)—some processors may rent planters—about $825; Flex-tine harrow (5-section), $650; sugar beet cultivator (6-row) complete with tools, $500 to $800; down-the-row thinner (6-row), $800; fertilizer spreader (10-foot), about $325; harvester (1-row), $3,500 to $4,000; harvester (2- or 3-row), $4,500 to $5,500; trucks for delivery of crop to receiving station.

Labor. The processing company recruits and arranges for the labor for hand thinning and hoeing. Growers pay workers established rates. Growers must provide approved housing equipped for living. Good mechanical thinning and weeding will take the place of much hand labor.

COSTS AND RETURNS

Cost of Production. The following table showing costs of producing an acre of beets is based on custom rates.

Table 1. Costs of Producing an Acre of Sugar Beets in Eastern South Dakota, Based on Custom Rates

PRACTICE	COST*
Spreading commercial fertilizer	$ 1.00
Plowing	5.00
Harrowing seedbed 2 times @ $1.00	2.00
Discing	2.00
Floating, 2 times @ $2.00	4.00
Planting	2.00
Cost of beet seed, 5 lbs. @ $0.75/lb.	3.75
Commercial fertilizer, 400 lbs. $4.85/cwt. 24-20-0, off car	19.40
Flex-time harrowing, 3 times @ $0.75	2.25
Down-the-row thinning with machine	2.00
Down-the-row cultivation, 4 times @ $1.75	7.00
Hand labor thinning and hoeing	20.50†
Irrigation (cost of labor)	8.00
Spraying (insect control, if needed)	3.75
Harvesting a 15-ton crop @ $2.00/ton	30.00
Hauling, average 4-mile haul @ $.07/ton/mile on 15 tons beets (will vary with distance hauled)	4.20
Water, depreciation, taxes, etc.	13.59‡
Total cost per acre	**$130.44**
Freight (grower pays 50%), avg. $1.50/ton on 15 ton crop	22.50
Cost including rail freight	**$152.94**

*These costs are based on custom rates. Farmers costs will be somewhat less when he uses his own labor.

†Cost of hand labor may be as low as $9.50 per acre if good mechanical thinning and weeding is practiced.

‡Based on cost per acre inch, $1.13, assuming 12 acre inches are applied.

Potential Net Income. The following potential net income table is figured on a crop of 15 tons per acre.

Potential net income can be figured on any tonnage by using $14.83 per ton as an average price and a total cost of $152.94.

Beet tops are worth much more than $1.25 per ton of beets harvested if put up as silage or hand fed to livestock as dried tops. The Scotts Bluff, Nebraska, Experiment Station states that beet top silage, fed to lambs and dairy cattle in feeding tests, has proved equal in feeding value, pound for pound, to good corn silage.

Table 2. Potential Net Income per Acre of Sugar Beets Yielding 15 Tons per Acre

SOURCE	INCOME
4-year avg. price of $14.83/ton on 15 tons	$212.45
Beet tops at $1.25/ton (based on yield of beets)	18.75
Gross income	$231.20
Less production costs	152.94
Net return per acre (15-ton crop)	**$ 78.26**

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